PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE HONORABLE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of

Donald J. CURRY et al.	On Appeal from Group: 2625
Application No.: 10/776,508	Examiner: N. TYLER
Filed: February 12, 2004	Docket No.: 118591

For: APPARATUS AND METHODS FOR DE-SCREENING SCANNED DOCUMENTS

APPEAL BRIEF TRANSMITTAL

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Attached hereto is our Brief on Appeal in the above-identified application.

The Commissioner is hereby authorized to charge Deposit Account No. 24-0037 in the amount of $540.00, in payment of the fee due under 37 C.F.R. 41.20(b)(2). In the event of any underpayment or overpayment, please debit or credit our Deposit Account No. 24-0037 as needed in order to effect proper filing of this Brief.

Respectfully submitted,

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PATENT APPLICATION

Xerox Docket No. D/A4023

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BRIEF ON APPEAL

Appeal from Group 2600

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TABLE OF CONTENTS

I. REAL PARTY IN INTEREST

The real party in interest for this appeal and the present application is Xerox Corporation, by way of an Assignment recorded in the U.S. Patent and Trademark Office at Reel 014937, Frame 0030.

II. RELATED APPEALS AND INTERFERENCES

There are no prior or pending appeals, interferences or judicial proceedings, known to Appellants, Appellants' representative, or the Assignee, that may be related to, or that will directly affect or be directly affected by or have a bearing upon, the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-20 are on appeal.

Claims 1-20 are pending.

No claims are allowed.

Claims 1-20 are rejected.

No claims are withdrawn from consideration.

No claims are canceled.

IV. STATUS OF AMENDMENTS

No Amendment After Final Rejection has been filed.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The citations in the following summary of claimed subject matter are provided in relation to the specification as filed.

Independent claim 1 is directed to a method for de-screening image data including the steps of: generating an estimated screen frequency (Figs. 1 and 7, screen frequency estimate signal Scm) of the image data (paragraph [0030]); selecting two or more filters (Figs. 9 and 11, filters F_3 to F_11) from a filter bank (Figs. 9 and 11, filter bank module 140) based directly on the estimated screen frequency and one or more limit parameters (paragraph [0055], filtered contrast value signal Clo and kill control signal Kill) (paragraph [0062], see also paragraphs [0052]-[0055]); filtering the image data (Figs. 1-2, 9 and 11, source signal Scr) using the selected two or more filters from the filter bank such that the image data is filtered by each of the selected two or more filters resulting in two or more filtered image data (Fig. 9, signals BLR_1 to BLR_5) each corresponding to either the entire image data or a same portion of the image data (paragraph [0062]); and blending the two or more filtered image data to form blended image data (Fig. 9, color blended signal BLV) (paragraph [0062]).

Independent claim 9 is directed to an apparatus to de-screen image data that includes: a screen frequency estimater (paragraph [0030], 1-channel screen frequency estimate module) to generate an estimated screen frequency of the image data (paragraph [0030]); a filter selector (Fig. 1, pixel control module 42) to select two or more filters (Figs. 9 and 11, filters F-3 to F_11) from a filter bank (Figs. 9 and 11, filter bank module 140) based directly on the estimated screen frequency and one or more limit parameters (paragraph [0055], filtered contrast value signal Clo and kill control signal Kill) (paragraph [0062], see also paragraphs [0052]-[0055]); a filterer (Fig. 1, variable triangular blending filter module 50) to filter the image data (Figs. 1-2, 9 and 11, source signal Scr) using the selected two or more filters from

the filter bank such that the image data is filtered by each of the two or more filters to result in two or more filtered image data (Fig. 9, signals BLR_1 to BLR_5) each corresponding to either the entire image data or a same portion of the image data (paragraph [0066]); and a filter output blender (Fig. 9, variable blend module 142; paragraph [0066]) to blend the two or more filtered image data into blended image data (Fig. 9, color blended signal BLV) (paragraph [0062]).

Independent claim 18 is directed to an apparatus to de-screen image data that includes: means for generating an estimated screen frequency of the image data (which is a means-plus-function element, the corresponding structure, materials, and functions are disclosed at paragraph [0030], 1-channel screen frequency estimate module, and paragraph [0030]); means for selecting two or more filters (which is a means-plus-function element, the corresponding structure, materials, and functions are disclosed in Fig. 1, pixel control module 42, and paragraphs [0048], [0062], and [0052]-[0055]), the means for selecting two or more filters selecting two or more filters (Figs. 9 and 11, filters F-3 to F_11) from a filter bank (Figs. 9 and 11, filter bank module 140) based directly on the estimated screen frequency and one or more limit parameters (paragraph [0055], filtered contrast value signal Clo and kill control signal Kill) (paragraph [0062], see also paragraphs [0052]-[0055]); means for filtering the image data (which is a means-plus-function element, the corresponding structure, materials, and functions are disclosed in Fig. 1, variable triangular blending filter module 50, and paragraph [0066]), the means for filtering the image data filtering the image data (Figs. 1-2, 9 and 11, source signal Scr) using the selected two or more filters from the filter bank such that the image data is filtered by each of the two or more filters resulting in two or more filtered image data (Fig. 9, signals BLR_1 to BLR_5) each corresponding to either the entire image data or a same portion of the image data (paragraph [0066]); and means for blending the two or more filtered image data (which is a means-plus-function element, the

corresponding structure, materials, and functions are disclosed at Fig. 9, variable blend module 142; paragraph [0062] and [0066]), the means for blending blending the filtered image data into blended image data (Fig. 9, color blended signal BLV).

Dependent claim 19 recites a means for increasing sharpness. The means for increasing sharpness is a means-plus-function element. The corresponding structure, materials, and functions are disclosed in Fig. 1, variable sharpening and neutral module 52, and paragraph [0077]. The means for increasing sharpness increases the sharpness of a selected portions of blended image data if a luminance of a selected portion is below a predetermined threshold, a magnitude of sharpness being increased with increasing magnitude of the luminance (paragraph [0025]).

Independent claim 20 is directed to a tangible computer-readable storage medium (paragraph [0082]) storing a set of program instructions to de-screen image data and executable on a data processing device, the set of program instructions including: instructions for generating an estimated screen frequency (Figs. 1 and 7, screen frequency estimate signal Scm) of the image data (paragraph [0030]); instructions for selecting a plurality of filters (Figs. 9 and 11, filters F_3 to F_11) from a bank of filters (Figs. 9 and 11, filter bank module 140) based directly on the estimated screen frequency and one or more limit parameters (paragraph [0055], filtered contrast value signal Clo and kill control signal Kill) (paragraph [0062], see also paragraphs [0052]-[0055]); instructions for causing the image data (Figs. 1-2, 9 and 11, source signal Scr) to be filtered using selected plurality of filters from the filter bank such that the image data is filtered by each of the plurality of filters resulting in a plurality of filtered image data (Fig. 9, signals BLR_1 to BLR_5) each corresponding to either the entire image data or a same portion of the image data (paragraph [0062]); and instructions for blending the plurality of filtered image data into blended image data (Fig. 9, color blended signal BLV) (paragraph [0062]).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The following grounds of rejection are presented for review:

Claims 1-2, 5, 8-10, 13, 15-18 and 20 are rejected under 35 U.S.C §103(a) over the combination of U.S. Patent No. 6,728,381 to Hosoya, U.S. Patent No. 5,333,064 to Seidner et al. (Seidner), and U.S. Patent No. 5,343,309 to Roetling;

Claims 3, 4, 6, 11, 12 and 19[1] are rejected under 35 U.S.C. §103(a) over Hosoya, Seidner, and Roetling, and further in view of U.S. Patent No. 5,822,467 to Lopez; and

Claims 7 and 14 are rejected under 35 U.S.C. §103(a) over Hosoya, Seidner, and Roetling, and further in view of U.S. Patent No. 6,538,771 to Sakatani et al. (Sakatani).

[1] The Office Action does not list Claim 19 in the rejection header, but claim 19 is addressed in the body of the rejection.

VI. ARGUMENT

Regarding independent claims 1, 9, 18 and 20, the applied references fail to disclose all the claimed features because (A) it would not have been obvious to combine the references given the teachings of the references taken as a whole; (B) it would not have been obvious to combine the references because the combination would render Hosoya unsuitable for its intended purpose; and (C), even if the proposed combination is made, the proposed combination would not result in all the features of the independent claims.

A. It Would Not Have Been Obvious To Combine The References As Proposed Given The Teachings Of The References Taken As A Whole

Hosoya discloses a system for reducing noise in a video signal, such as produced by a video tape recorder (VTR) (col. 4, lines 21-25). The Office Action cites to Fig. 18 in rejecting independent claims 1, 9, 18 and 20. Fig. 18 shows multiple band pass filters (BPFs) 12a-12n, which extract predetermined frequency components (col. 4, lines 26-30). The filtered signal components are (a) limited to reduce the signal strength, (b) band pass filtered to reduce harmonics introduced by the step of limiting, and (c) subtracted from the original signal (Figure 18.) The predetermined frequency components correspond to carrier frequencies in the video signal (col. 4, lines 26-29). Because Hosoya discloses band pass filters each centered at a different carrier frequency, Hosoya fails to disclose producing two or more filtered image data each corresponding to either the entire image or a same portion of the image data, as claimed. The Office Action states that Hosoya fails to disclose (1) generating an estimated screen frequency, and (2) selecting filters based on the estimated screen frequency, but cites to Seidner for these features.

Seidner discloses a system for de-screening color half-toned (HT) images by de-screener 12. De-screener 12 has a plurality of screen removal filters 20 and a switch 24, operated by controller 22, to switch among the filters 20 (Fig. 1, col. 7, lines 39-50). The

Office Action cites to Fig. 7, showing a method of de-screening. At Fig. 7, step 50, the de-screener 12 evaluates the screen parameters, including the frequency and angle of the half-toned image (col. 12, lines 58-60). At Fig. 7, step 52, a plurality of screen removal filters are produced (col. 12, lines 66-68). At Fig. 7, step 56, the de-screener 12 de-screens the half-toned image (col. 13, lines 7-10). The choice of which filter 20 is used is based on the location of the output pixel (col. 7, lines 46-48; col. 8, lines 53-65). Because Seidner discloses that controller 22 operates switch 24 to select one of the filters 20 to filter each output pixel, Seidner fails to disclose production of two or more filtered image data each corresponding to either the entire image or the same portion of image data, as claimed. The Office Action acknowledges that Hosoya modified by Seidner fails to disclose selection of a filter from a filter bank, but cites to Roetling for this feature.

Roetling discloses a system that implements a programmed procedure 30 (Fig. 2) to de-screen half-toned images by an iterative, adaptive filter. The Office Action cites to col. 5, line 38 and Fig. 2. In operation, the image is processed by a low pass filter at block 34 (Fig. 2) to produce a first approximation image (FAI) (col. 6, lines 29-31). The pixels are then sequentially processed at block 36 by an adaptive filter having one or more sets of pre-selected features (Fig. 2, col. 6, lines 31-42). Each pixel is processed by only one filter selected under feedback control based on the content of the FAI (col. 6, lines 42-45). Because Roetling discloses that each pixel is filtered by one filter, Roetling does not disclose production of two or more filtered image data each corresponding to either the entire image or a same portion of the image data, as claimed.

In summary, Hosoya discloses removal of background/broadband noise from a composite video signal of multiple carrier signals in which each carrier signal is filtered by one bandpass filter; Seidner discloses de-screening color half-toned (HT) images in which

each pixel is filtered by <u>one filter</u>; and Roetling discloses de-screening half-toned images in which each pixel is processed by only <u>one filter</u> selected under feedback control.

Taking the references as a whole, it would not have been obvious to combine Hosoya with either Seidner or Roetling. Hosoya is directed to removal of <u>background noise</u> from <u>video signals</u>. Hosoya's filters are designed to correspond to the <u>frequencies of carrier signals</u> in the video signals. In contrast, Seidner and Roetling are directed to <u>de-screening</u> a <u>single</u> half-toned <u>image</u> to remove half-tone screen artifacts. In Seidner, the choice of screen removal filter 20 that is used is <u>based on the location of the output pixel</u>. In Roetling, the filter chosen is based on feedback control <u>based on the content of the FAI for the pixel</u>. One of ordinary skill would not have modified Hosoya by either Seidner or Roetling because Hosoya, on one hand, and Seidner and Roetling, on the other hand, are directed to removing different kinds of noise (background noise versus half-tone screen artifacts) from different original data (video signals versus half-tone images). Thus, there is no technical reason to modify Hosoya by Seidner and Roetling as proposed by the Patent Office.

Further, no half-tone screen artifacts are in the video signals of Hosoya. As there are no half-tone screen artifacts in Hosoya that can be removed, there would be no benefit to modifying Hosoya by either Seidner or Roetling. That is, none of Hosoya, Seidner, and Roetling suggests (1) that band pass filters can be applied to filtering half-tone images or can be used to remove half-tone screen artifacts; or (2) that de-screening filters can be applied to video signals or can be used to remove background/broadband noise. Thus, there is no reason, in the references taken as a whole, to make the proposed combination. Thus, the Office Action relies on impermissible hindsight in rejecting Appellants' claims in view of the combination of references.

B. It Would Not Have Been Obvious To Combine The References Because The Combination Would Render Hosoya Unsuitable For Its Intended Purpose

Hosoya discloses the use of multiple bandpass filters 12a-12n each of which extracts a specific noise component around a corresponding video component of the video signal (col. 4, lines 26-29) that needs to be removed from the video signal. The noise being removed is always present in the input video signals around each of the video components. In other words, each bandpass filter is used in Hosoya because each bandpass filter provides a useful function of reducing noise in the video signal.

In Hosoya, every filter used is required at all times because the noise is always present in all the frequency ranges. Because all of the bandpass filters are required all of the time, Hosoya is understandably silent as to any benefit that would result from using multiple filters when only one of the filters is needed.

In contrast, as taught by Roetling, only a single filter is used to remove a given screen frequency once the screen frequency is determined.

The Office Action alleges that Hosoya can be modified by Roetling and Seidner to include generating an estimated screen frequency and to select filters based on the selected screen frequency. However, under the proposed combination, the fixed bandpass filters 12a-12n of Hosoya would be modified to be selected based on estimated screen frequencies based on half-tone screen artifacts as taught by Roetling and Seidner. Under this combination, first, no filters would be used in Hosoya as the Hosoya video signal does not contain any half-tone screen artifacts and, as a result, the processing by Roetling and Seidner would not be able to generate any estimated screen frequency. Second, even if the processing taught by Roetling and Seidner would produce an estimated screen frequency, only one filter, the filter best correlated to the estimated screen frequency would be selected. As a result, the noise around the video components of Hosoya that do not correspond to the selected filter would not be

removed. Thus, the proposed modification of Hosoya would not remove the noise about the majority of the video components, rendering Hosoya unsuitable for its intended purpose of removing the noise around all the video components of the video signal, in violation of MPEP §2143.01(V).

C. Even If Combined, The Applied References Fail To Disclose All The Features Of The Claims

Even if the proposed combination is made, it would not result in (1) "selecting two or more filters from a filter bank based directly on the estimated screen frequency and one or more limit parameters"; (2) "filtering the image data using the selected two or more filters from the filter bank such that the image data is filtered by each of the selected two or more filters resulting in two or more filtered image data each corresponding to either the entire image data or a same portion of the image data"; and (3) "blending the two or more filter data" (emphasis added), as recited in independent claim 1, or the corresponding elements, means, and instructions of independent claims 9, 18 and 20.

If Hosoya is modified by Seidner and Roetling, the resulting combination would be the Hosoya system modified to remove half-tone screen artifacts as taught by Seidner and Roetling. Because Seidner discloses selecting a pixel's filter based on the location of the output pixel and Roetling discloses selecting a pixel's filter under feedback control based on the content of the FAI for the pixel, the proposed combination would not result in filters being selected "based directly on the estimated screen frequency ..." as recited in feature (1) quoted above. Additionally, as discussed above, none of Hosoya, Seidner and Roetling discloses filtering of a same portion of the image data or the entire image data by two or more filters. Thus, features (2)-(3) also would not result from the proposed combination made by the Patent Office.

Neither Lopez nor Sakatani, cited as disclosing features of dependent claims, overcomes the deficiencies in Hosoya, Seidner and Roetling described above.

VII. CONCLUSION

For all of the reasons discussed above, it is respectfully submitted that the rejections are in error and that claims 1-20 are in condition for allowance. For all of the above reasons, Appellants respectfully request this Honorable Board to reverse the rejections of claims 1-20.

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APPENDIX A - CLAIMS APPENDIX

CLAIMS INVOLVED IN THE APPEAL:

1. A method for de-screening image data, comprising:

generating an estimated screen frequency of the image data;

selecting two or more filters from a filter bank based directly on the estimated screen frequency and one or more limit parameters;

filtering the image data using the selected two or more filters from the filter bank such that the image data is filtered by each of the selected two or more filters resulting in two or more filtered image data each corresponding to either the entire image data or a same portion of the image data; and

blending the two or more filtered image data to form blended image data.

2. The method of claim 1, further comprising

generating a blend select signal that indicates how the two or more filtered image data are to be blended.

3. The method of claim 2, further comprising:

sharpening selected portions of blended image data based on luminance of the blended image data.

4. The method of claim 3, the sharpening comprising:

increasing sharpness of a selected portion if a luminance of the selected portion is below a predetermined threshold, a magnitude of sharpness being increased with increasing magnitude of the luminance.

5. The method of claim 1, further comprising:

generating intermediate filter selecting signals based on the estimated screen frequency;

generating a filter selecting signal based on the intermediate filter selecting signals and the one or more limit parameters;

selecting the two or more filters from the filter bank based on the filter selecting signal.

6. The method of claim 2, further comprising:

selecting a luminance component of a portion of the blended image data; and

adjusting the luminance component of the portion of the blended image data based on a sharpness control signal.

7. The method of claim 2, further comprising:

selecting chroma components of a portion of the blended image data; and

adjusting the chroma components of the portion of the blended image data based on a neutral control signal.

8. The method of claim 2, wherein the operations of generating, selecting filtering and blending are performed dynamically.

9. An apparatus to de-screen image data, comprising:

a screen frequency estimater to generate an estimated screen frequency of the image data;

a filter selector to select two or more filters from a filter bank based directly on the estimated screen frequency and one or more limit parameters;

a filterer to filter the image data using the selected two or more filters from the filter bank such that the image data is filtered by each of the two or more filters to result in two or more filtered image data each corresponding to either the entire image data or a same portion of the image data; and

a filter output blender to blend the two or more filtered image data into blended image data.

10. The apparatus of claim 9, further comprising:

a blend selector to generate a blend select signal that indicates how the outputs of the selected two or more filters are to be blended.

11. The apparatus of claim 10, further comprising:

an image data sharpener to sharpen selected portions of blended image data based on luminance of the selected portions.

12. The apparatus of claim 11, wherein the image data sharpener increases sharpness of a selected portion if a luminance of the selected portion is below a predetermined threshold, a magnitude of sharpness being increased with increasing magnitude of the luminance.

13. The apparatus of claim 9, wherein the filter selector generates intermediate filter selecting signals based on the estimated screen frequency, and generates the filter selecting signal based on the intermediate filter selecting signals and one or more limit parameters.

14. The apparatus of claim 10, further comprising:

an image data neutralizer to neutralize selected portions of blended image data based on chroma components of the selected portions.

15. A xerographic marking device incorporating the apparatus of claim 9.

16. A scanning device incorporating the apparatus of claim 9.

17. A digital photocopier incorporating the apparatus of claim 9.

18. An apparatus to de-screen image data comprising:

means for generating an estimated screen frequency of the image data;

means for selecting two or more filters from a filter bank based directly on the estimated screen frequency and one or more limit parameters;

means for filtering the image data using the selected two or more filters from the filter bank such that the image data is filtered by each of the two or more filters resulting in two or more filtered image data each corresponding to either the entire image data or a same portion of the image data; and

means for blending the two or more filtered image data into blended image data.

19. The apparatus of claim 18, further comprising:

means for increasing sharpness of a selected portions of blended image data if a luminance of a selected portion is below a predetermined threshold, a magnitude of sharpness being increased with increasing magnitude of the luminance.

20. A tangible computer-readable storage medium storing a set of program instructions to de-screen image data and executable on a data processing device, the set of program instructions comprising:

instructions for generating an estimated screen frequency of the image data;

instructions for selecting a plurality of filters from a bank of filters based directly on the estimated screen frequency and one or more limit parameters;

instructions for causing the image data to be filtered using selected plurality of filters from the filter bank such that the image data is filtered by each of the plurality of filters resulting in a plurality of filtered image data each corresponding to either the entire image data or a same portion of the image data; and

instructions for blending the plurality of filtered image data into blended image data.

APPENDIX B -EVIDENCE APPENDIX

NONE

APPENDIX C - RELATED PROCEEDINGS APPENDIX

NONE